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ABSTRACT

Readability formulas can be useful tools in accomplishing their primary purpose--to give very general estimates of difficulty. Unfortunately, there has been a great deal of misunderstanding regarding their use, which has resulted in misuse and abuse. The formulas were designed to be applied post hoc to existing materials. They were not intended to serve as guides for writing. Publishers, eager to guarantee that their materials are suitable for indicated student populations, require writers to "write to formula" or later make revisions if grade level designations are too high. Many believe that readability formula scores can be used in conjunction with the grade equivalency scores students achieve on standardized reading tests to effect an appropriate match between reader and text. Such a belief is unsupported in fact. Given the imprecise nature of both the formulas and the test scores, it is ultimately the teacher's responsibility to select appropriate reading material for his or her students. Interest and motivation, neither of which is taken into account by the formulas, are key factors in determining what a student will or will not read, and will or will not comprehend. Formulas can yield useful information, but only teachers themselves can take into account the many factors that affect their own students' comprehension and make better judgments on this basis than are possible on the basis of formula scores alone. (Some suggestions for enabling students to comprehend are included.) (HOD)

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Readability and Reading Ability:

Implications for the Classroom

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Readability and Reading Ability: Implications for the Classroom

The use of readability formulas to make judgments about which texts are appropriate for particular readers has increased during recent years. In order to avoid the abuse of tools which can be useful in certain ways, it is important to understand something of their history, development and underlying assumptions, as well as strengths and weaknesses. Their application may become still more widespread with the advent of microcomputer programs for even the most complex traditional formulas. It is critical that teachers, school administrators, textbook adoption committees, and publishers place readability analysis in proper context, employing it with some sense of its limitations.

FOUNDATIONS

Readability of printed material has been variously defined as legibility, power to interest, ease of understanding or any combination of these factors, including their interactions. Gray and Leary (1935) identified as many as 288 characteristics of text affecting readability, twenty of which were thought to be significantly related to readability. The factors could be classified within four broad categories: format, general features of organization, style of expression and presentation, and content.

The goal of readability research is the appropriate matching of reader and text. Prior to the development of "scientific"

methods of predicting readability, teachers and librarians made judgments about whether a particular book was suitable for a particular reader by taking into account the reader's interests, background and abilities as well as the format and difficulty of the text. The search for more objective means of matchmaking has resulted in investigations to determine which factors are valid in distinguishing easy from hard material. There has also been concern for creating reliable methods to measure these factors.

In the interest of simplifying the task, early readability researchers defined readability as "comprehensibility" and focused on the linguistic elements of text thought to contribute to ease of understanding. In order to quantify readability, formulas were developed which use counts of language variables to provide an index of probable difficulty for readers (Klare, 1974).

Readability formulas, however, do not have the precision of chemical and mathematical formulas. The use of the word "formula" in the context of readability carries scientific implications which are unfounded in fact (Dreyer, 1984). A passage of text placed at the third grade level by one formula may be placed at the fourth grade level by another and at the fifth grade level by still another. A single book may contain passages which vary several grade levels in difficulty even when just one formula is applied (Fitzgerald, 1981).

Readability formulas do not define readability. They measure factors which can correlate with difficulty, but they do not point to all the features of text which affect comprehension (Davison, et al., 1980).

Assumptions underlying the most commonly used readability formulas are that sentence length and word length or percentage of "unfamiliar" words determine degree of difficulty. Shorter words or more commonly used words and shorter sentences are thought to be characteristic of text that is more easily understood. Conversely, longer words and sentences are assumed to contribute to difficulty. It is important to realize that longer words and sentences may be correlated with difficulty, while not necessarily causing difficulty.

In some instances, longer words and sentences are less complex than shorter ones. "Absolutely," a four-syllable word, is easier to read than "psychic," a word with two syllables. It is apparent that a sentence such as "Once out, he breathed more easily," is harder to comprehend than the longer sentence "He breathed more easily once he was out of the room" (Hamlin, 1979).

Familiarity of vocabulary as defined by word lists compiled decades ago is equally open to criticism as a criterion. By such definition, the words "dwell," "gooseberry" and "fife" are familiar to young people, whereas "television," "hamburger," and "zoo" are not.

The Dale-Chall formula (Dale & Chall, 1948) is an example of one frequently used by publishers of educational materials to assess readability. It requires the comparison of vocabulary used against that on the Dale List of 3,000 Familiar Words. The percentage of "unfamiliar" words and the average sentence length are then entered into the formula to produce a score. The score, it should be noted, is the reading grade score of a pupil who could answer correctly one-half of the test questions over passages from the McCall-Crabbs Standard Test Lessons in Reading (1925). It is questionable that a 50% comprehension criterion or a correlation of .7 with grade scores on the passages is desirable.

The Dale-Chall formula and others, including the Lorge formula (1959) and SMOG Grading (McLaughlin, 1969), use the Standard Test Lessons in Reading as a criterion measure of difficulty. Stevens (1980) has indicated that employing this instrument for such purposes is inappropriate in that the Test Lessons were neither adequately standardized nor intended for such use.

Readability formulas are predictive devices and at best yield only estimates, not actual measurements of difficulty. Dale and Chall (1948) made no claim that their formula is infallible, but rather that is a "short cut in judging the difficulty of written materials." Lorge (1959) made a similar statement: "The Lorge formula provides an over-all estimate which should be useful in grading materials. As an estimate it should not be considered definitive nor should it be used blindly."

A book is readable only if it is readable to the intended reader, regardless of its formula score. Readability formulas are limited in the amount of information they can give. By focusing on just two linguistic elements (usually word length and sentence length), the formulas exclude from consideration many other significant factors affecting ease or difficulty of understanding.

With respect to the linguistic features of text, other factors to be taken into account include those which relate to syntax and complexity of sentences, unusual positioning of sentence components or clauses and number of dependent clauses.

Readability formulas do not measure textual factors such as word frequency, concept density, level of abstraction nor whether there is appropriate organization, coherence and logical presentation of ideas. In fact, formulas cannot distinguish scrambled text from well-ordered prose. With particular reference to basal readers, the number of new words in a story and the number of words which require decoding skills not yet learned have bearing upon difficulty but are not taken into account by the formulas.

Factors of format or graphic design such as length of type line, hyphenated words, long paragraphs, confusing punctuation (or lack of punctuation), full pages of type, style and size of typeface, illustration and color, can all affect readability.

Readability formulas can be useful tools in accomplishing their primary purpose--to give very general estimates of difficulty.

Unfortunately, there has been a great deal of misunderstanding regarding their use, resulting in misuse and abuse.

The formulas were designed to be applied post hoc to existing materials. They were not intended to serve as guides for writing. Publishers, eager to guarantee that their materials are suitable for indicated student populations, require writers to "write to formula" and/or later make revisions if grade level designations are too high. Revision techniques may include substituting list words or shorter words for what might be more appropriate or expressive words and by shortening or dividing sentences. The resulting material may indeed be less comprehensible than the original version. The same may be true of the adaptation of existing texts for younger or less skilled readers (Davison, et al., 1980).

"Writing-to-formula" inhibits authors in several ways. It is extremely difficult to write intelligently about many topics when constrained by formulas which use a familiar word list. Because many non-listed words may be required in order to write about them, some topics cannot be discussed on a readability level that would inspire the interest of students intended. This is particularly the case with specialized topics. Authors attempting to write high interest materials for older students who are poor readers find vocabulary restrictions a particular burden. Subjects likely to interest such students may be excluded because words

which are familiar to the students, i.e., 'jeans,' 'soccer,' and 'softball,' are not on the list (DeLawter, 1980). With respect to content area material, powerful excerpts that writers might include from primary sources like documents and letters or newspapers may be revised to fit the formulas and thereby forfeit original impact.

Such restrictions ultimately victimize learners who may be denied the stimulation and satisfaction good writing can bring. Writers of well-respected juvenile literature may decline to have their works included in school texts in order to avoid being required to alter the original works or to permit staff writers to rewrite them to conform to a formula.

FORMULA SCORES AND TEST SCORES

Many believe that readability formula scores can be used in conjunction with the grade equivalency scores students achieve on standardized reading tests to effect an appropriate match between reader and text. Such a belief is unsupported in fact.

As was previously suggested, different formulas are likely to yield disparate scores when applied to the same passage or text. It does not seem possible that one formula will yield a "true score," given the general limitations of readability formulas.

In addition, there are erroneous assumptions regarding the concept of grade equivalency score. It is well known that different

tests purporting to measure the same abilities or skills do not generate comparable grade equivalency scores, in part because of variations in standardization procedures among test publishers. In a study by Dreyer, Muller and Erichson (1984) two widely used standardized reading achievement tests were administered to 53 fourth graders and 66 eighth graders. Each of the youngsters took the appropriate levels of both tests under controlled conditions. It was found that 71% of the total sample scored .6 grade equivalency units ("six months") or more differently across tests and 53% of the sample scored 1.0 ("one year") or more differently when grade equivalency scores across tests were compared. Thirty-three percent scored 2.0 grade equivalency units or more differently across tests.

Identical grade equivalency scores achieved on different tests do not necessarily represent the same degree of performance. The same score may be achieved by students whose characteristics as readers vary considerably. A grade equivalency score of 8.0 could be obtained by a fourth grader, an eighth grader or a twelfth grader but would have different meanings in each instance. A grade equivalency score of 8.0 achieved by a fourth grader indicates above average performance on that test, not that eighth grade reading materials are especially appropriate for that child. The youngster may not have acquired the reading skills or background knowledge needed for success with those materials. On the other hand, when an eighth grader earns a grade equivalency score of

4.0, even less information is given than in the first case. It is likely that the youngster has difficulty with reading, but it is not apparent what the nature of the difficulty is. It should also be considered that 4.0 may be the lowest grade equivalency score achievable on the particular form and level of the test taken, or that the student obtained a "chance score" of twenty to twenty-five percent correct. Even if 4.0 were the student's "true score," it is doubtful that the content of reading materials intended for beginning fourth graders would interest that youngster.

There are other problems associated with standardized reading tests and grade equivalency scores. These relate to the tests themselves and include reliability, the standard error of measurement and the manner in which grade equivalency scores are derived (Baumann & Stevenson, 1982). Difficulties with test scores can also arise from factors within the student and/or the testing situation which affect performance on a certain day.

Given the imprecise nature of both the formulas and the test scores, it is ultimately the teacher's responsibility to select appropriate reading material for his/her students, possibly using the scores as a guide. Teachers can employ strategies which will promote and enhance student comprehension of materials selected. Suggestions are provided in the final section.

SOME NEW DIRECTIONS

Recent research has added to our store of information about what makes text readable. Readability is not an inherent property of texts, but results instead from the interaction between reader and text.

Interest and motivation, neither of which are taken into account by the formulas, are key factors in determining what a student will or will not read, what a student will or will not comprehend (Harrison, 1980).

Shnayer (1969) found that interest as a factor of reading comprehension is significantly more important for poorer readers than for average or fluent readers. His results suggest that two years is the approximate jump in reading level that a highly motivated reader can make. (In general, it may be reasonable to assume that students can cope with texts up to two years above their own reading level when the youngster's motivation is high or the teacher's close support is available.)

A high degree of motivation or interest can override other factors, but teachers need to consider carefully the difficulty of texts which are read under conditions of low motivation (Harrison).

"Conceptual readability" focuses on the concepts being communicated by the text, in contrast to the emphasis placed on textual characteristics by the formulas. This newer approach asks that written material be analyzed in terms of several factors related to the underlying conceptual difficulty of the topic or content of the text and the clarity with which the content is

expressed. Included also are the way in which ideas are presented and the extent to which inferences must be made by the reader. The reader's own world knowledge, knowledge of the language and knowledge of the comprehension process itself are important considerations as well (Rubin, 1981).

Although promising directions are now being explored in relationship to readability, at present, publishers, textbook adoption committees and school personnel seem to rely heavily on formula scores in making decisions about the suitability of reading materials for specific student populations. It should, however, be kept in mind that readability formulas were intended to yield estimates of difficulty and are useful guides if no more is expected than they can give.

SUGGESTIONS FOR TEACHERS

Teachers can have more confidence in their own assessments of what is appropriate reading material for their students while taking publishers' readability scores into account. They can consider the demands of the text together with an evaluation of the reader's prior knowledge, general reading ability, and level of interest and motivation.

Formula scores should not be used to deny children what they want to read, but instead, a high score should be considered a warning signal of possible difficulties to be encountered and the need for conscientious monitoring on the part of the teacher. If materials appear to be somewhat too difficult, but interesting and

worthwhile, teachers can enable their students to comprehend. Some suggestions:

1) Give a small preview of attention-catching content as a means for "sparking" student interest.

2) Provide students with purpose-questions and help them to formulate their own purpose-questions. Those who have a well-defined purpose for reading understand what they are expected to know and be capable of doing when they complete their reading.

3) Discuss with students what they already know about essential concepts prior to reading, using examples that are concrete and familiar to those specific students. They can be helped to relate new information to that already known.

4) Ongoing comprehension can be facilitated by discussion that directs students' learning. Newly acquired concepts can be reinforced through well-designed questions which may also serve to build up expectations and focus attention on major points.

5) Unfamiliar and specialized vocabulary words should be introduced prior to reading. Each field has its own terminology. It is important to keep in mind that readability formulas were not designed for specialized texts. Texts judged to be difficult according to readability measures become much less so if the reader is familiar with and understands special terms.

Whenever possible, new words should be taught through direct experiences. Simulated experiences can substitute in instances where real experiences are not feasible.

Students can be helped to pronounce new words by locating easier root words within longer ones. Prefixes and suffixes can be analyzed in context. Polysyllabic words can be divided into syllables, thereby making them more manageable.

6) If using textbook material that requires new or seldom-used skills, such as interpreting tables or graphs, introduce or review these skills before students need to use them in reading. Special aids available within a textbook (index, appendices or glossary) can be brought to the students' attention. Students should be reminded to apply other appropriate study skills and techniques.

7) Teachers can develop study guides to help students read attentively and critically. A touch of novelty can be added to maintain interest. The guide need not be lengthy. One or two well-conceived questions may suffice.

8) Teachers can read aloud difficult segments of text, aiding comprehension through emphasis. A model of skilled reading would also be provided in this manner.

9) In the content areas it may not be possible to find one textbook that is appropriate for all students in a class. In such a case, it might be preferable to plan differentiated reading assignments as a means for individualizing the reading assignments within a class. Students are thus encouraged to read from different sources but for the same purpose. The differentiated reading

assignment enables classroom teachers to employ the unit approach with its common objectives but to select the assignment suitable for each student.

10) There is a great deal of interest currently in the development of metacognition, i.e., knowledge and control of one's own thinking and learning activities. Effective readers have some awareness and control of the cognitive activities they engage in as they read (Brown, 1982). Comprehension monitoring is an important aspect of metacognition related to reading. Teachers can encourage students to keep track of the success with which comprehension is proceeding and to take remedial action if necessary. Often a careful and active rereading of a passage results in effective comprehension. Students can be trained to monitor and evaluate their own progress with respect to the purposes for which they are reading.

In summary, readability formulas were devised to supplant teacher judgment and provide objective means for choosing appropriate reading material for specific students. Formulas can yield useful information, but only teachers themselves can take into account the many factors which affect their own students' comprehension and make better judgments than are possible based on formula scores alone. Teachers can certainly help to make material more readable to their students and aid students in becoming active learners.

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